

MIL-F-18866H  
6 May 1987

SUPERSEDING  
MIL-F-18866G  
9 JULY 1984

MILITARY SPECIFICATION  
FITTINGS, HYDRAULIC TUBE, FLARED,  
37 DEGREE AND FLARELESS,  
STEEL

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers 37 degree flared and flareless steel tube fittings, 1500 and 3000 pounds per square inch (psi) maximum design pressure, -65 Deg to 250 Deg Fahrenheit temperature range, for use in hydraulic or air systems.

1.2 Classification. Fittings shall be furnished in the types designated by the applicable Military Standard (MS) part number (see 6.2).

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto in the solicitation (see 2.4.1 and 6.2).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document, should be addressed to: Commander, U.S. Army ARDEC, ATTN: SMCAR-ESC-S, Picatinny Arsenal, New Jersey 07806-5000 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 4730

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SPECIFICATIONS

(see SUPPLEMENT 1 for list of Federal and Military Specifications)

STANDARDS

FEDERAL

FED-STD-66	Steel, Chemical Composition and Hardenability
FED-STD-151	Metal, Test Methods
FED-STD-H28	Screw Thread Standards for Federal Services

MILITARY

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129	Marking for Shipment and Storage
MIL-STD-147	Palletized Unit Loads
MIL-STD-753	Corrosion-Resistant Steel Parts, Sampling, Inspection and Testing for Surface Passivation

(see SUPPLEMENT 1 for list of MS sheet form standards)

2.2 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DODISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the non-Government documents which are current on the date of the solicitation (see 2.4.2 and 6.2).

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

*SAE J514	- Hydraulic Tube Fittings
SAE J515	- Hydraulic "O" Ring

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

*ASTM A380	- Cleaning and Descaling Stainless Steel Parts, Equipment and Systems
*ASTM B633	- Electrodeposited Coatings of Zinc on Iron and Steel
*ASTM D3951	- Practice for Commercial Packaging
*ASTM E18	- Tests for Rockwell Superficial Hardness of Metallic Materials
ASTM E384	- Test Method for Microhardness of Materials

AEROSPACE MATERIAL SPECIFICATIONS (AMS)

AMS 5643	- Steel Bars, Forgings, Tubing and Rings, Corrosion Resistant
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AMERICAN TRUCKING ASSOCIATION, INCORPORATED

National Motor Freight Classification

\*DOD Adopted

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.4 Sources of documents.

2.4.1 Government specifications, standards, and handbooks. Copies of the referenced federal and military specifications, standards, and handbooks are available from the Department of Defense Single Stock Point, Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120-5099. For specific acquisition functions, these documents should be obtained from the contracting activity or as directed by the contracting activity.

2.4.2 Sources for non-Government publications. Non-Government documents are generally available for reference from libraries and technical groups. The documents listed may be obtained as follows:

a. SAE: Copies may be purchased from the Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096.

b. ASTM: Copies may be purchased from the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

c. AMS: Copies may be purchased from the Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096.

d. NATIONAL MOTOR FREIGHT CLASSIFICATION: Copies may be purchased from the American Trucking Association, Inc., 1616 P Street NW, Washington, DC 20036.

3. REQUIREMENTS

3.1 Material. Fittings covered by this specification shall be made from either carbon steel or corrosion-resisting steel conforming to 3.1.1 through 3.1.2 as specified in the MS part number. Exceptions are monel and copper-nickel alloy (QQ-N-281) which cover optional materials for MS51527 elbows.

3.1.1 Carbon Steel. Carbon steel used in the manufacture of fittings and applicable nuts shall be any carbon steel listed in FED-STD-66, provided the maximum carbon content is no more than 0.20 percent and the maximum phosphorus content is no more than 0.12 percent.

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3.1.1.1 Sleeves, 37 deg flared. Carbon steel sleeves for 37 deg flared type tube fittings shall be made from SAE 1015, 1020, 1137, 11L37, 1141, 12L14 or AISI 1008, 1010, 1213 and 1215 steels in accordance with FED-STD-66.

3.1.1.2 Sleeves, flareless. Carbon steel sleeves for flareless type tube fittings shall be made from SAE 1010, 1112, 1113, 12L14 or AISI 1008, 1213 and 1215 steels in accordance with FED-STD-66.

3.1.1.3 Back-up washers. All carbon steel back-up washers shall be made from SAE 1010 or 1015 steels in accordance with FED-STD-66.

3.1.1.4 O-Rings. When O-Rings are required, they shall be in accordance with MIL-P-5510 or SAE J515, Type 1.

3.1.2 Corrosion-resisting steel. Corrosion-resisting steel used in the manufacture of fittings including applicable nuts, sleeves and back-up washers, shall conform to any of the corrosion-resisting steels listed in the 300- series of FED-STD-66. For flareless sleeves only, 17-4PH corrosion-resisting steel in accordance with AMS 5643 shall be used.

3.1.3 Recycled material. It is encouraged that recycled material be used, when practical, as long as it meets the requirements of this specification.

3.2 Finish. Fittings shall be furnished in accordance with the applicable documents listed in Table I.

TABLE I. Finish

MATERIAL	TYPE OF FINISH	APPLICABLE DOCUMENT
Carbon Steel	Cadmium Plating (1)	MIL-C-81562, Type II, Class 3 or QQ-P-416, Type II, Class 3
	Zinc Coating (1)	ASTM B633, Type II, SC1
	Phosphate Coating (2) (3)	DOD-P-16232, Class 1
Corrosion-Resisting Steel	Passivation (4)	ASTM A380, Chemical Descaling Method

(1) For new design it is recommended that zinc coating be specified in place of cadmium plating whenever contact with salt atmosphere is not a problem.

(2) For new design it is recommended that phosphate coating be specified when electrodeposited zinc or mechanically-deposited cadmium plating are not required.

(3) Phosphate coated fittings shall be subjected to all tests as specified in DOD-P-16232, Class 1, except for the salt spray test. The salt spray test is required only to verify the phosphating process or changes thereto.

(4) Passivated fittings shall be subjected only to the copper sulfate tests as specified in MIL-STD-753, Test Method 102. Fittings passing this test shall be returned to stock for usage after each fitting is thoroughly rinsed in deionized water and thoroughly dried.

### 3.3 Hardness.

3.3.1 Finished corrosion-resisting steel parts. Unless otherwise specified in the contract or order (see 6.2), the minimum hardness for finished corrosion-resisting steel parts, other than flareless sleeves (see 3.3.3) shall be Rockwell B80 and the maximum hardness shall be Rockwell C32.

3.3.2 Sleeves, flareless, carbon steel. Unless otherwise specified in the contract or order (see 6.2), carbon steel flareless sleeves shall be case hardened to a depth of 0.0010 to 0.0019 inch. The hardness of the core shall not exceed Rockwell B99.5.

3.3.3 Sleeves, flareless, corrosion-resisting steel. Unless otherwise specified in the contract or order, corrosion-resisting steel flareless sleeves shall be treated in such a manner as to produce a minimum through-hardness of Rockwell C41.8 or 423 KHN (Knoop)(see 6.2).

### 3.4 Design.

3.4.1 Design and construction. Fittings, when properly assembled, shall insure a leakproof full-flow connection up to 3000 psi working pressure or 6000 psi proof pressure for sizes -2 through -16 (1/8 through 1 inch) and 1500 psi working pressure or 3000 psi proof pressure for sizes -20 through -32 (1-1/4 through 2 inch). Working pressure is the established recommended pressure based on a safety factor of four to one (4 to 1). However, fittings may have an increased working pressure based on any or all of the following factors: reduced tube size, increased tube wall thickness and reduced safety factor. The 1/4-inch fittings may have an increased working pressure up to 5000 psi maximum. Prior to such use, supporting test data shall be approved by both the procuring agency and the manufacturer.

3.4.2 Design and dimensions. Fittings shall be in accordance with the applicable MS sheets specified herein and, if not specified, in accordance with Society of Automotive Engineers Standard SAE J514 (see 1.2).

3.4.2.1 Sleeve design. Flareless sleeves shall be furnished in the style (A or B per MS51825) as specified (see 6.2).

3.4.3 Shape and form restrictions. Abrupt reductions of section shall be avoided. Small external sections adjoining relatively heavy body sections shall

be shaded into the heavier sections by means of ample fillets. There shall be no sharp corners or inadequate fillets, excessive undercuts, or excessive grooves at the junction of such small sections with large sections of fittings.

3.4.4 Drill offset. On straight fittings where the fluid passage is drilled from each end, the offset between the drilled holes at the meeting point of the drills shall not exceed .015 inch. It shall be possible to pass through the fluid passage a ball whose minimum diameter is .020 inch less than the minimum diameter specified for the passage. On angle fittings, the cross-sectional area at the junction of the fluid passage shall be not smaller than the cross-sectional area of the smaller passage.

3.4.5 Wall thickness. The wall thickness at any point on the fitting shall be not less than the thickness established by the dimensions, tolerances and eccentricities for the inside and outside diameters specified in the applicable MS given herein (see 1.2).

3.4.6 Straight threads. Straight threads shall conform to the Unified Screw Thread Standard, Class 2A and 2B, in accordance with the Screw Thread Standards for Federal Services, FED-STD-H28.

3.4.7 Taper pipe threads. Taper pipe threads shall conform to the American National Standard Pipe Thread (Dry Seal - NPTF) in accordance with FED-STD-H28.

3.4.8 Back-up washers. MS51889 back-up washers shall be furnished on all adjustable fittings. Washers are to be installed on fittings by the manufacturer.

### 3.5 Marking.

3.5.1 Identification of product. Fittings shall be marked as specified in 3.5.2 and 3.5.3. Stamped markings shall be applied in a location not detrimental to the function of the fittings prior to the application of the corrosion-protective finish specified in 3.2.

3.5.2 Trademark. Unless otherwise specified, all fittings shall be stamped with manufacturer's name or trademark, except for sleeves which shall be stamped at the option of the manufacturer (see 6.2).

3.5.3 Additional marking. If specified, all fittings made from corrosion-resisting steel, except sleeves, shall be permanently stamped with the composition number of steel (see 6.2).

3.5.3.1 Sleeve marking. All flareless sleeves made from corrosion-resisting steel shall be marked with a light knurl on the perimeter of the largest O.D.

3.6 Lubrication. During assembly, an anti-friction compound, oil or petroleum lubricant may be used on the sleeves and threads of carbon steel and of corrosion-resisting steel fittings. A dry film lubricant, a lubricous coating, may be added to the threads of corrosion-resisting steel nuts.

3.7 Workmanship. Workmanship shall conform to the best commercial practice to produce high quality fittings. Fittings shall be free from all hanging burrs, loose scale and slivers which might become dislodged in usage and all other defects which might affect their performance. All sealing surfaces shall be smooth, except that annular tool marks up to 100 micro-inch maximum, peak to valley, will be permissible.

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or order, contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

#### 4.2 Quality conformance.

4.2.1 Quality conformance inspection. The quality conformance inspection shall consist of the examination of 4.3 and the tests of 4.5. This inspection is based on lot formation with a random sample taken from each lot in accordance with MIL-STD-105. The Inspection Levels and AQLs shall be as specified.

4.2.2 Lot. A lot shall consist of all fittings and sleeves of the same type, size, class material composition, manufactured under essentially the same conditions and submitted for acceptance at one time (see 6.2).

4.3 Examination of fittings and sleeves. Fittings and sleeves, as applicable, shall be visually and dimensionally inspected to verify compliance with the requirements of this specification. The classification of defects in Table II is the minimum that shall be used in the examination. Samples shall be selected in accordance with MIL-STD-105, Inspection Level II. The Acceptable Quality Levels (AQLs) shall be as specified in Table II.

#### 4.4 Sampling for tests.

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4.4.1 Sampling for tests of fittings. A random sample of fittings shall be selected from each lot and tested as specified in 4.5. Samples shall be selected in accordance with MIL-STD-105, Special Inspection Level S-2 with an AQL of 2.5.

4.4.2 Sampling for tests of sleeves. A random sample of flareless sleeves shall be selected from each lot and tested as specified in 4.5.3. Samples shall be selected in accordance with MIL-STD-105, Special Inspection Level S-2, with an AQL of 2.5.

4.5 Tests.

4.5.1 Hardness test. The fittings selected in accordance with 4.4.1 shall be tested for hardness in accordance with ASTM E18 or ASTM E384 to determine conformance to 3.4.

4.5.2 Chemical analysis. When requested by the inspector, certification showing conformance with the applicable material specification shall be made available. When specified, chemical analysis shall be in accordance with Method 111.2 of FED-STD-151 (see 6.2).

TABLE II. Classification of Defects.

CATEGORIES	DEFECTS	INSPECTION METHOD
<u>Major</u>	AQL - 2.5 percent defective	
101	Fittings, not designated by applicable MS (1.2)	SIE#
102	Sealing surface, not as specified (3.7)	SIE#
103	Dimensions, not as specified (3.4.2)	SIE#
104	Threads, not as specified (3.4.6 and 3.4.7)	SIE#
105	Material, not as specified (3.1)	SIE#
106	Shape and form reduction abrupt: Small external sections not shaded into heavy body section by fillets; fittings have sharp corners; inadequate fillets; excessive undercuts or grooves (3.4.3)	Visual
107	Bores drilled from each end exceed specified tolerance at drill meeting point; size of fluid passage of angle fittings, not as specified (3.4.4)	SIE#
108	Wall thickness of fittings, less than dimensions and tolerances specified (3.4.5)	SIE#
109	Protective coating, not as specified (3.2)	Visual
<u>Minor</u>	AQL - 4.0 percent defective	
201	Markings absent, not located as specified, not permanent, not legible, data not complete (3.5)	Visual

#Standard Inspection Equipment



4.5.3 Tests for sleeves. Each of the sample flareless sleeves, selected in accordance with 4.4.2 shall be tested per 4.5.3.1 and 4.5.3.2.

4.5.3.1 Case depth and hardness test. Case depth and hardness test shall be conducted as follows:

a. Remove plating, grind and polish end of sleeve perpendicular to sleeve axis. In this manner, the cutting edge is removed.

b. Immerse samples in etchant (2 percent Nital) for a sufficient length of time for the desired etch, about 8 to 10 seconds.

c. Wash in hot water, immerse in alcohol and blow dry.

d. Take at least three measurements at different points on the sleeve. The case depth and hardness shall be in accordance with 3.3.2 and 3.3.3.

4.5.3.2 Cut tests. Corrosion-resisting steel tubing (MIL-T-8504) shall be used for cut tests of sleeves and performance test for corrosion-resisting steel fittings. SAE 1010 steel tubing shall be used for the performance tests for carbon steel fittings. The sleeves shall be assembled to the tubing in accordance with 4.5.4.3.1 and Table IV. After disassembly, each sleeve shall be driven back to expose the ring cut for examination. The cut shall completely encircle the periphery of the tube. There shall be no longitudinal or circumferential cracks on the sleeve before driving back. Circumferential crazing marks on the end of the sleeve in the neighborhood of the cutting edge are permitted.

4.5.4 Design capability testing of fittings.

4.5.4.1 Design certification. In order to provide a basis for certifying to the design requirements of 3.4, fitting manufacturers shall pressure test each of their product designs as outlined in 4.5.4.2 and 4.5.4.3.

4.5.4.2 Design capability test - 37 deg flared. When specified, a minimum of five (5) 37 deg flared fittings of each size, shape and material shall, after being lubricated, be assembled with mating fittings in a manner similar to Figures 1, 2 and 3 as applicable (see 6.2). The body, nut, sleeve and tubing, single flared per MS33584, shall be of like material using corrosion-resisting steel tubing per MIL-T-8504 or SAE 1010 tubing as applicable. The tube nut shall be tightened to the minimum torque load specified in Table III for the applicable assembly size. The pipe threaded end, or straight thread with O-ring end fitting or straight thread fitting, whichever is applicable, shall be tightened to the point where leakage shall not occur, at a proof pressure of 6000 psi for size -2 through -16 and proof pressure of 3000 psi for size -20 through -32. Under this pressure, there shall be no leakage or distortion of the assembly. The assembly shall then be pressurized to the point at which leakage or rupture occurs and the results shall be recorded.

TABLE III. Torque load for tightening 37 deg flared tube nut.

Tubing O.D. Inches	Torque Inch-Pounds		Tubing O.D. Inches	Torque Inch-Pounds	
	Min	Max		Min	Max
1/8	75	85	5/8	620	680
3/16	95	105	3/4	855	945
1/4	135	145	7/8	1050	1200
5/16	170	190	1	1140	1260
3/8	215	245	1-1/4	1520	1680
1/2	430	470	1-1/2	1900	2100
			2	2660	2940

## 37° FLARED TUBE FITTING

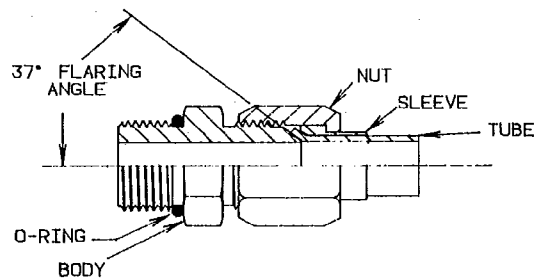


FIGURE 1. Typical fitting assembly showing body, O-ring, nut, sleeve and tube.

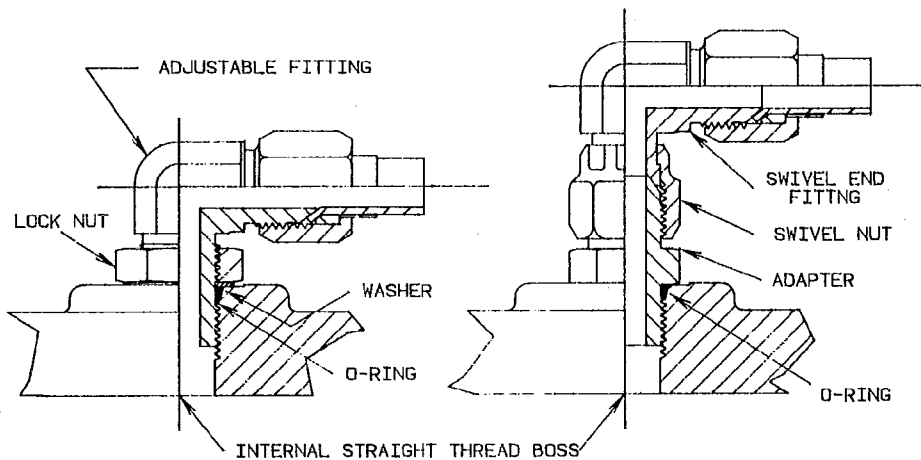


FIGURE 2. Adjustable fitting, typical installation.

FIGURE 3. Swivel end fitting, typical installation.

4.5.4.3 Design capability test - flareless. When specified, a minimum of five (5) flareless fittings in each size, shape and material shall be assembled with mating fittings in a manner similar to Figures 4, 5 and 6 as applicable (see 6.2). The body, nut, sleeve and tubing shall be of like material using corrosion-resisting steel tubing per MIL-T-8504 or SAE 1010 tubing as applicable.

4.5.4.3.1 Presetting of sleeves. Sleeves shall be preset on tubing before assembly using a presetting machine, or the fitting, by tightening the nut to the number of turns specified in Table IV, past the point of ring grip.

4.5.4.3.2 Resetting of sleeves. After presetting the sleeve as specified in 4.5.4.3.1, the nut shall be completely disengaged, inspect sleeve for proper bite, reassemble to fitting body wrenching the nut 1/6 to 1/4 turn, maximum, beyond the point where a sudden increase in torque is noted.

4.5.4.3.3 Assembly test. The pipe threaded end, or straight thread with O-ring end fitting or straight thread fitting, whichever is applicable, shall be tightened to the point where leakage shall not occur, at a proof pressure of 6000 psi for sizes -2 through -16 and proof pressure of 3000 psi for sizes -20 through -32. Under this pressure, there shall be no leakage or distortion of the assembly. The assembly shall then be pressurized to the point at which leakage or rupture occurs and the results shall be recorded.

TABLE IV. Preset - tube tightening limits

Tubing O.D. Inches	Wall Thickness (Inch)		Number of Turns
	SAE 1010	MIL-T-8504	
1/8	.020	.020	1-1/6
3/16	.020	.020	1-1/6
1/4	.028	.028	1-1/6
5/16	.035	.028	1-1/6
3/8	.049	.035	1-1/6
1/2	.065	.049	1-1/6
5/8	.083	.065	1
3/4	.083	.065	1
7/8	.095	.083	1
1	.120	.083	5/6
1-1/4	.148	.109	1
1-1/2	.180	.120	1
2	.220	.188	1

## FLARELESS TUBE FITTING

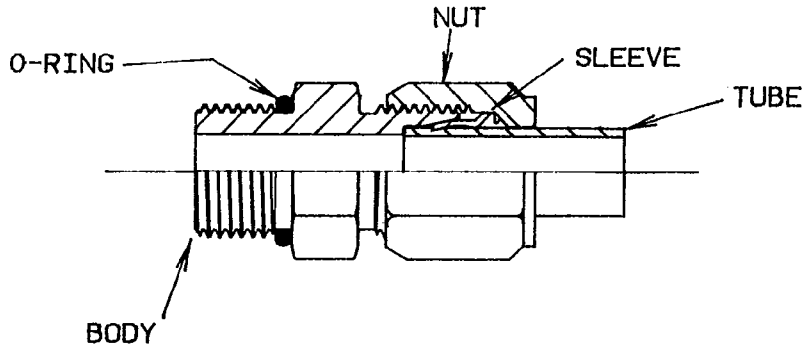


FIGURE 4. Typical fitting assembly showing body, O-ring, nut, sleeve and tube.

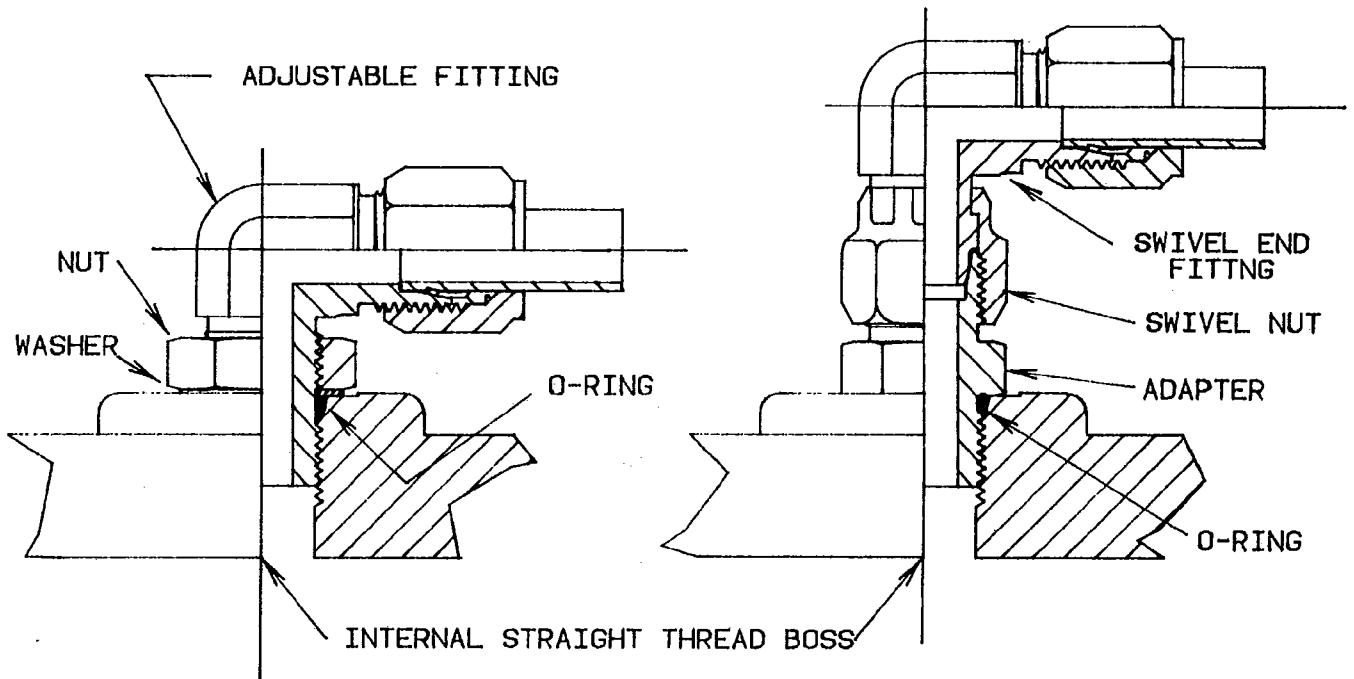


FIGURE 5. Adjustable fitting, typical installation.

FIGURE 6. Swivel end fitting, typical installation.

4.5.4.4 Design capability test reports. Results of design capability tests shall be maintained on file by the fitting manufacturers, available for review by the Government upon request.

4.6 Inspection of packaging. The preservation, packing and marking shall be inspected for compliance with Section 5 of this document.

## 5. PACKAGING

5.1 Preservation. Preservation shall be level A or B, or industrial, as specified (see 6.2). The materials, methods, processes and procedures specified herein shall conform to the requirements of MIL-P-116.

### 5.1.1 Level A.

5.1.1.1 Cleaning. The fittings shall be cleaned by process C-1.

5.1.1.2 Drying. The fittings shall be dried by an applicable procedure of MIL-P-116 not injurious to the item.

### 5.1.1.3 Preservative application.

5.1.1.3.1 Carbon steel fittings. Carbon steel fittings finished with cadmium plating, zinc coating or phosphate coating shall be coated with a medium preservative oil, type P-7.

5.1.1.3.2 Corrosion-resisting steel (passivated) fittings. Corrosion-resisting steel (passivated) fittings shall not require a preservative application.

### 5.1.1.4 Unit pack. Unit pack quantities shall be as specified in 6.2.

5.1.1.4.1 Carbon steel fittings. The unit pack for carbon steel fittings furnished with cadmium plating, zinc coating or phosphate coating shall be in accordance with Method IC-1 of MIL-P-116.

5.1.1.4.2 Corrosion-resisting steel (passivated) fittings. The unit pack for corrosion-resisting steel (passivated) fittings shall be in accordance with Method III of MIL-P-116 by enclosing in bag, carton or other type container.

5.1.1.5 Intermediate pack. The intermediate pack shall consist of unit packs in quantities as specified in 6.2, placed in a fiberboard box conforming to PPP-B-636, class weather-resistant, style optional. Closure shall be in accordance with the appendix of the container specification.

5.1.2 Level B. Preservation shall be the same as specified for Level A (see 5.1.1).

5.1.3 Industrial. Packaging shall be in accordance with ASTM D3951.

5.2 Packing. Packing shall be Level A or B, or industrial, as specified (see 6.2).

5.2.1 Level A. The fittings shall be packed in a close-fitting wood box conforming to PPP-B-601, overseas type, style optional, grade B. Closure/reinforcement shall be in accordance with the requirements of the container specification.

5.2.2 Level B. The fittings shall be packed in a close-fitting fiberboard box conforming to PPP-B-636 or PPP-B-640, class weather-resistant, style optional or a wood box conforming to PPP-B-601, domestic type, style optional, grade B. Closure/reinforcement shall be in accordance with the requirements of the container specification.

5.2.3 Industrial. Packing shall be in accordance with ASTM D3951.

5.2.4 Palletized loads. When specified, palletized loads, commensurate with the level of packing specified in the contract or order, shall be furnished in accordance with MIL-STD-147. Palletized loads shall be uniform in size and quantities to the greatest extent possible. If the container is of a size which does not conform to any of the pallet patterns specified in MIL-STD-147, the pallet pattern used shall first be approved by the contracting officer (see 6.2).

### 5.3 Marking.

5.3.1 Military Levels A and B. Marking of unit, intermediate and exterior containers shall be in accordance with MIL-STD-129.

5.3.2 Industrial. Industrial marking shall be in accordance with requirements of ASTM D3951.

6. INFORMATION FOR GUIDANCE ONLY (This section contains information of a general or explanatory nature which is helpful, but is not mandatory.)

6.1 Intended use. 37 deg flared fittings are intended for use with steel tubing in hydraulic systems. Flareless fittings are intended for use in hydraulic or air systems. Carbon steel sleeves may be used only with fully annealed 70-30 copper-nickel or carbon steel tubing. Corrosion-resisting steel sleeves may be used with fully annealed 70-30 copper-nickel, 70-30 nickel-copper, corrosion-resisting steel or carbon steel tubing. These fittings are not intended for use in aircraft.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number and date of this specification.
- b. Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1 and 2.2).

- c. MS part number (1.2).
- d. Hardness requirement, if different (3.3).
- e. Style of flareless sleeve required (3.4.2.1).
- f. Trademark (3.5.2).
- g. Additional marking (3.5.3).
- h. Marking (3.6).
- i. Lot composition, if different than specified (4.2.2).
- j. If chemical analysis is to be in accordance with Method III.2 of FED-STD-151 (4.5.2).
- k. Design capability tests, if required (4.5.4.2 and 4.5.4.3).
- l. Selection of applicable levels of preservation and packing required (5.1 and 5.2).
- m. Quantity required in unit pack (5.1.1.4).
- n. Quantity required in intermediate pack (5.1.1.5).
- o. When palletized loads are required (5.2.4).

6.2.1 A statement should be included in the invitation for bids requiring the contractor to specify in his bid or proposal the composition of steel the contractor proposes to use for production of the fittings.

6.2.2 Boss. Straight thread O-ring bosses, for swivel and adjustable fittings, shall be in accordance with MS16142.

6.3 Subject term (key word) listing.

Fittings, Hydraulic Tube

Fittings, Hydraulic Tube, Flared

Fittings, Hydraulic Tube, Flared, 37 Deg

Fittings, Hydraulic Tube, Flared, 37 Deg and Flareless

Fittings, Hydraulic Tube, Flared, 37 Deg and Flareless, Steel

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6.4 Changes from previous issue. The margins of this specification are marked with asterisks or vertical lines to indicate where changes (additions, modifications, corrections, deletions) from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

Custodians:

Air Force - 99  
Army - AR  
Navy - OS

Preparing Activity:

Army - AR

Agent Activity:

DLA - CS

Review Activities:

Air Force - 82  
Army - GL, ME  
DLA - CS  
Navy - SH

(Project Number 4730-0761)

User Activities:

Army - AT, AV  
Navy - MC, YD